

USE OF APR-DRG IN 15 ITALIAN HOSPITALS

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ABSTRACT

We report here on the results of a project carried out in fifteen Italian hospitals to determine the feasibility and validity associated with the use of the APR-DRG system and to evaluate the performance of this classification system for case-mix analysis. The study was based on 428.926 discharges abstract data collected from July 1997 to June 1998.

KEYWORDS: Discharge Abstract; HCFA-DRG; APR-DRG; Outcome Analysis

INTRODUCTION

The Health Care Financing Administration DRG are used in Italy to standardising hospital product definition since 1995. This system, maintained and calibrated for elderly patients in the United States, is inadequate as a classification scheme for reporting services incurred in treating non-Medicare patients' conditions and for explaining the relative resource demand based on individual patient characteristics (i.e. severity of illness).

This paper briefly describes the results of a project we conducted in Italy to test the ability of the All-Patient Refined (APR) DRG classification system to standardising hospital case-mix measurement. APR-DRG is a system that focuses on both the under- and over-65 year old population and incorporates explicit severity adjustment (i.e. refinement) as an integral part of their design. The overall purpose of the project was to determine the feasibility and validity associated with the use of the APR-DRG system at Italian hospitals and evaluate its performance for case-mix analysis.

METHODS

Fifteen hospitals participated in the study. They range from teaching hospitals to general hospitals, both private and public. The analysis was performed using the data available from discharge abstracts. Information available through hospital discharge abstract included: patient demographics ; date of admission and discharge ; discharge status ; principal diagnosis and up to nine secondary diagnoses coded using the International Classification of Disease, nine revision, Clinical Modification (ICD-9-CM); up to nine surgical procedures codes coded using ICD-9-CM; birth weight (for neonates).

The APR-DRG Grouper revision 12.0 was used to assign three descriptors – i.e. final group; subclass of severity of illness (minor; moderate; major; and extreme); subclass of risk of mortality (minor; moderate; major; and extreme) – to each case.

We produced and circulated among professionals a training manual on abstracting information from medical record to discharge abstracts; in addition, each hospital used a Codefinder to assign ICD-9-CM codes to diagnoses and procedures. These tools were particularly important because in Italy medical record professionals are not professionally recognised by Government, University education and training programs on abstracting and coding are not available, and there is no standard available such as Coding Clinics.

To evaluate the quality of the administrative databases, we carried out an assessment of the reliability of the abstracting process based on a blind re-abstracting by one physician of the project team of a sample of fifty medical records in seven hospitals. Errors of concordance between discharge abstracts and medical records were subdivided into five categories: wrong selection of the principal diagnosis; low specificity of the principal diagnosis reported; uncomplete reporting of secondary diagnoses; wrong

selection of the principal procedure; and uncomplete reporting of other procedures. The term 'uncomplete' refers to missed complications or comorbidities or to missed significant procedures.

We circulated among hospital the APR-DRG definitions manuals and the grouping software to let professionals evaluate the clinical coherence of the classification system (i.e. face validity).

The performance of the system was evaluated in terms of reduction in variance (R^2) for length of stay. The data were trimmed by excluding within each DRG the 1 percent of patients with the highest values of the variable being analysed and 0,5 percent of the patients with the lowest values.

RESULTS

We collected data on 428.926 discharges from July 1997 to June 1998. The number of cases, the average length of stay, and the average number of diagnosis and procedures codes per hospital is reported in table 1. Table 2 compares the percentage distribution of cases per Major Diagnostic Category (MDC) between the project database and the hospital discharge abstract data collected by the Italian Ministry of Health nation-wide.

Table 1 Number of cases, ALOS and average number of diagnoses and procedures reported per discharge abstract per hospital

Hospital Code	Status	Number of cases	ALOS	CV	Average number of diagnosis	Average number of procedures
01	General Hospital (Public)	73.793	11,9	1,2	2,1	2,09
03	Research Institute (Private)	5.153	7	0,78	2,29	1,1
04	General Hospital (public)	9.728	5,34	1,06	2,26	1,65
05	General Hospital (Public)	37.096	8,34	1,14	2,01	1,74
07	Teaching Hospital (Public)	12.375	8,98	1,61	2,08	1,98
08	Research Institute (Private)	926	13,93	1,71	2,23	1,98
09	General Hospital (Public)	9.774	7,17	1	2,31	2,02
10	General Hospital (Public)	7.386	7,17	1,01	2,26	2,3
11	Teaching Hospital (Public)	4.153	8,67	1,44	2,36	1,59
12	Hospital (Private)	28.822	6,3	1,13	1,85	1,48
13	Teaching Hospital (Public)	115.439	7,54	1,34	2,41	2,67
14	Hospital (Private)	49.998	8,43	1,02	2,28	2,6
15	General Hospital (Public)	16.179	7,04	1,4	2,27	2,15
16	General Hospital (Public)	29.316	8,81	1,22	2,09	2,49
17	Teaching Hospital (Public)	28.788	8,39	1,2	2,15	2,55
Total		428.926	8,5	1,27	2,21	2,27

ALOS: Average Length of Stay; CV: Coefficient of Variation

The results of the re-abstracting study showed that the error rate in selecting the principal diagnosis ranges between 0-16 %, and that between 32-72% of the discharge abstracts presented an uncompleted reporting of secondary diagnoses (Table 3). The average number of missed diagnosis per discharge equals 1,3.

The analysis of the structural characteristics of the APR-DRG classification system on the part of the panel of clinicians and administrators working in Italian hospitals allowed the identification of the major strengths of the system when compared to HCFA-DRG as:

- the focus on “All-Patient” population;
- the use of age at admission and birth weight as classification variables of cases into MDC 15;
- the possibility of differentiating patients groups by severity of illness;
- the definition of a risk adjustment model for in-hospital mortality;

- the use of specific procedures (e.g. mechanical ventilation) to modify the subclass level.

Table 2. Comparison of the percentage distribution of cases per MDC. APR-DRG Project and Italian Ministry of Health Hospital Discharge Abstract Database

MDC	Description	% of cases	
		APR-DRG Project	Ministry of Health
1	Diseases and Disorders of the Nervous System	6,7	7,2
2	Diseases and Disorders of the Eye	3,1	3,9
3	Diseases and Disorders of the Ear, Nose, Mouth and Throat	6,3	5,5
4	Diseases and Disorders of the Respiratory System	6,6	6,2
5	Diseases and Disorders of the Circulatory System	14,9	12,5
6	Diseases and Disorders of the Digestive System	11,4	10,9
7	Diseases and Disorders of the Hepatobiliary System and Pancreas	4,9	4
8	Diseases and Disorders of the Musculoskeletal System and Connective Tissue	7	12,3
9	Diseases and Disorders of the Skin, Subcutaneous Tissue and Breast	5,2	4,5
10	Endocrine, Nutritional and Metabolic Diseases and Disorders	2,3	2,2
11	Diseases and Disorders of the Kidney and Urinary Tract	5,7	4,6
12	Diseases and Disorders of the Male Reproductive System	2,3	2
13	Diseases and Disorders of the Female Reproductive System	3,5	3,8
14	Pregnancy, Childbirth and Puerperium	6,8	7,5
15	Newborns and Other Neonates with Conditions Originating in the Perinatal Period	2,3	1,4
16	Disease and Disorders of the Blood and Blood Forming Organs and Immunological Disorders	1	0,9
17	Mieloproliferative Diseases and Disorders and Poorly Differentiated Neoplasms	4,1	1,7
18	Infectious and Parasitic Diseases	0,7	0,7
19	Mental Diseases and Disorders	1,5	2,5
20	Alcohol/Drug Use and Alcohol/Drug Induced Organic Mental Disorders	0,3	0,5
21	Injuries, Poisoning and toxic Effects of Drugs	1	1,2
22	Burns	0,1	0,1
23	Factors Influencing Health Status and Other Contacts with Health Services	0,9	1,1
24	Human Immunodeficiency Virus Infections	0,1	0,1
25	Multiple Significant Trauma	0,2	0,3

The major weaknesses were identified as:

- the high number of final groups (1530 in revision 12.0);
- the inclusion of complication of care in the subclass assignment process;
- the dependence of the system on multiple comorbidities to assign severity levels.

The results of the statistical analysis of the performance of the system showed that the reduction in variance (RIV) in length of stay using APR-DRG is 0,317 (trimmed data), as compared to 0,269 when the Medicare DRG are used on the same database; an increase in the reduction in variance of less than 5% was reported for MDC 2 (Eye), 9 (Skin, subcutaneous tissue and breast), and 12 (Male reproductive).

Table 3. Comparison of the error rate by error type

Error type	Error rate (95% confidence interval)						
	Hosp01	Hosp03	Hosp04	Hosp05	Hosp07	Hosp11	Hosp13
Invalid principal Diagnosis	8 (0,5-15,5)	2 (0-5,9)	6 (0-12,6)	16 (5,8-26,2)	2 (0-5,9)	2 (0-5,9)	0
Low specificity of Principal diagnosis	6 (0-12,6)	2 (0-5,9)	0	2 (0-5,9)	8 (0,5-15,5)	0	10 (1,7-18,3)
Uncomplete reporting Of secondary Diagnosis	56 (42,2-69,8)	34 (20,9-47,1)	72 (59,6-84,4)	76 (64,2-87,8)	34 (20,9-47,1)	32 (19,1-44,9)	42 (28,3-55,7)
Invalid principal Procedure	0	0	0	0	0	0	0
Uncomplete reporting of Other procedures	14 (4,4-23,6)	2 (0-5,9)	0	16 (5,8-26,2)	10 (1,7-18,3)	0	6 (0-12,6)

DISCUSSION

The use of hospital discharge data requires classification to transform complex administrative data into information. The utilization of the APR-DRG system to measure case-mix proved to be very useful in the process of understanding aspects of resource consumption and quality of care within Italian hospitals. The system showed a lower performance on the Italian data if compared to the United States data. The value of the RIV in length of stay was 0,478 and 0,379 when APR-DRG and Medicare DRG were used on a data set including all patient discharged from 675 hospitals representative of acute general hospitals throughout the United States. Those values increase to 0,601 and 0,515 when costs figures are used.

The differences observed may be due to:

- quality of administrative data;
- the hospital organisation and financing;
- the threshold for admission;
- the clinical practice;
- the number of groups with no case assigned when the system is used on Italian electronic patient records.

We found that the performance of the system is highly dependent on the quality of administrative data. In particular, when used for comparison among facilities, a refined system may enlarge differences due only to the specificity and accuracy of the abstracting and coding process. The re-abstracting study confirms that we should continue to invest in training, education and awareness programs on discharge abstract data quality. We recognise that the introduction of a prospective payment system to finance inpatient hospital activity can facilitate the positive results of those programs.

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